

**WHAT IS CLAIMED:**

1. A method of evaluating a compound, the method comprising  
contacting a polypeptide having acetylase or deacetylase activity, or fragment thereof,  
5 with a compound, in the presence of a cytochrome c polypeptide, and  
evaluating if the compound modulates interaction between the polypeptide and the  
cytochrome c.
2. The method of claim 1, wherein the cytochrome c polypeptide is acetylated at at  
10 least one lysine.
3. The method of claim 1, wherein the cytochrome c polypeptide is full length  
cytochrome c.
- 15 4. The method of claim 1, wherein the cytochrome c polypeptide is human.
5. The method of claim 1, wherein the cytochrome c polypeptide is a fragment of  
between 3 and 20 amino acids of a full length cytochrome c.
- 20 6. The method of claim 1, wherein the polypeptide has deacetylase activity and is a  
SIR polypeptide.
7. The method of claim 6, wherein the SIR polypeptide is a human SIR polypeptide.
- 25 8. The method of claim 7, wherein the SIR polypeptide is SIRT1, SIRT2, or SIRT3.

9. A method comprising:

contacting a cell which expresses a polypeptide having acetylation or deacetylation activity and a cytochrome c polypeptide with a test compound, and determining if the test compound modulates acetylation of the cytochrome c polypeptide.

10. The method of claim 9 further comprising evaluating apoptosis or an indication of apoptosis in the cell.

10 11. A method of evaluating a test compound, the method comprising:

contacting a polypeptide having acetylase or deacetylase activity, or fragment thereof, with a test compound, in the presence of a cytochrome c polypeptide, *in vitro*, and evaluating if the test compound modulates interaction between the polypeptide and the cytochrome c;

15 contacting a cell which expresses a polypeptide having acetylation or deacetylation activity and a cytochrome c polypeptide with the test compound, and determining if the test compound modulates acetylation of the cytochrome c polypeptide in the cell.

20 12. A method of evaluating a protein, comprising:

identifying or selecting a candidate protein, wherein the candidate protein is a polypeptide having acetylation or deacetylation activity, or a cytochrome c polypeptide; altering the sequence, expression or activity of the candidate protein in a cell or in one or more cells of an organism; and determining whether the alteration has an effect on the interaction, of the polypeptide with a cytochrome c polypeptide, or on the deacetylation of cytochrome c.

25 13. A method of evaluating a protein, the method comprising:

a) identifying or selecting a candidate protein, wherein the candidate protein is a polypeptide having acetylation or deacetylation activity, or a cytochrome c polypeptide; b) identifying one or more polymorphisms in a gene that encodes the candidate protein; and

c) assessing correspondence between the presence of one or more of the polymorphisms and an interaction of the polypeptide with the cytochrome c, or with the deacetylation of the cytochrome c.

5        14. A method comprising:

providing a cell which expresses cytochrome c and which either over- or under-expresses the cytochrome c, contacting the cell with a compound; and

evaluating the compound for its ability to modulate acetylation in the cell.

10      15. The method of claim 14, wherein cell viability and apoptosis can be evaluated.

16. The method of claim 15, wherein a mitochondrial function is evaluated.

15      17. A method of modulating cell growth in an animal comprising modulating the acetylation status of a cytochrome c in the animal.

18. The method of claim 17 wherein cell growth is modulated using an antagonist or agonist of a deacetylase.

20      19. The method of claim 17 modulating cell growth by increasing acetylation of cytochrome c.

20. The method of claim 17 modulating cell growth by decreasing acetylation of cytochrome c.

25      21. The method of claim 18 wherein the deactylase is a human SIR polypeptide.